

CLAIMS

1. An intelligent STEP-NC comprising:
a control module for reflecting functional level
5 requirements of each controller of a machining tool;
a SFP/TPG module for reflecting data interface level
requirements; and
a common DB module for storing therein data generated,
updated and referred to by the control module and the
10 SFP/TPG module.
2. The STEP-NC of claim 1, wherein the control module
includes:
a setup manager for searching for a setup reference
15 position by moving a touch probe based on geometric
information of a workpiece and a jig when the workpiece is
placed on the machining tool;
a decision maker for determining a sequence of
workingsteps based on a diagnosis result, a monitoring
20 result and an inspection result provided from an emergency
handler, a monitor and an inspector, respectively;
an executor for converting a task sent from the
decision maker into a command, delivering the converted
command to a NCK/PLC, and memorizing the command performed
25 by the NCK/PLC for an adaptive control, wherein the NCK
interprets a tool-path command among commands provided from
the executor and operates a servo-mechanism to perform the
tool-path command while the PLC performs a machining tool
command among commands provided from the executor;
30 a monitor for continuously monitoring the whole
machining status by using a signal provided from a sensor,
and transferring the monitoring result to the emergency
handler or the decision maker, wherein the emergency handler
diagnoses an emergency when the emergency is reported from
35 the monitor and, then, provides the diagnosis result to the
decision maker;

an inspector for performing an in-process and a post-process inspection on the machining tool by using an OMM (on-machine measurement) and delivering the inspection results to the decision maker,

5 a learner for analyzing the in-process inspection result received from the inspector and storing the analyzed data in the common DB module; and

a communicator for interacting with external units.

10 3. The STEP-NC of claim 2, wherein the executor brings the NCK/PLC a corresponding tool-path from the common DB module if the task is concerned with a machining process but brings the NCK/PLC an alternative tool from a tool magazine if the task is concerned with a tool exchanging process.

15 4. The STEP-NC of claim 2, wherein the machining tool command is concerned with, e.g., a tool exchange and a loading/unloading of a workpiece.

20 5. The STEP-NC of claim 2, wherein the external units includes a CAD/CAM system, a shop-floor control system and an operator.

25 6. The STEP-NC of claim 1, wherein the SFP/TPG module includes:

an input manager for converting a CAD data inputted thereto into an internal geometric modeling kernel data, recognizing a machining feature, extracting a property value of the machining feature and storing the extracted property value of the machining feature in the common DB module;

30 a process planner for receiving the property value of the machining feature from the input manager, determining a process sequence, a machining task, a jig, a setup and a cutter that are required for the manufacturing of the machining feature, and storing the determined data in the
35 common DB module;

a tool-path generator for generating a tool-path for machining and measurement by using the determined data sent from the process planner, and storing the generated tool-path in the common DB module; and

5 a simulator for performing a cutting simulation before an actual machining process in order to verify the generated tool-path and find possible errors therein, and, then, storing the simulation result in the common DB module.

10 7. The STEP-NC of claim 1, wherein the common DB module includes:

a machining feature DB for storing machining feature information;

15 a machine resource DB for storing information on a structure of a machine, available tools, a tool magazine, a jig and a sensor;

20 a machining process DB for storing a nonlinear process plan for a machining process which is expressed by using machining features, machining operations, a machining strategy, cutting parameters and cutting tools;

a machining knowledge DB for machining knowledge by interacting with an expert system;

a tool-path DB for storing a tool-path generated for a workingstep; and

25 an inspection DB for storing a tool-path for a measurement and a result of the measurement.